Available online at https://www.ijasrd.org/

International Journal of Advanced Scientific Research & Development

Vol. 05, Iss. 08, Ver. I, Aug' 2018, pp. 24 – 30

e-ISSN: 2395-6089
p-ISSN: 2394-8906

THE BOON OF ARTIFICIAL INTELLIGENCE SYSTEMS IN THE 21st CENTURY

Dr. Samuel I. Onchoke [1*]

[1] Lecturer, Dept. of Business Administration and Management (DBAM), Technical University of Kenya.

ARTICLE INFO

Article History:

Received: 11 Jun 2018;
Received in revised form: 16 Aug 2018;
Accepted: 16 Aug 2018;
Published online: 10 Sep 2018.

Key words:

Benefits,
Artificial Intelligent Systems,
Operations.

ABSTRACT

As artificial intelligence and robotic systems take over more of the known from home appliances, driver assistance systems to route-finding in maps, there is need to foster a culture of innovation and research to find new business opportunities, challenges, create new products, experience and value. Based on this backdrop, this paper illuminates on the meaning, history and development of artificial intelligent systems and its practical application. The article describes some of the benefits of AI and robotic systems in operations. It also indicates the wide gap that prevails between developed and developing economies in terms of extensive development and utilizing expert systems; before making a conclusion in regard to what should be done by African economies in terms of reengineering the development and enhancement of skills of AI and robotics technology. Descriptive research design is applied in this case. The article is based on secondary sources of data such as magazines, news articles, books and relevant scholarly literature.

INTRODUCTION AND REVIEW OF LITERATURE

Information Technology enables, empowers people, improves quality of life, unlocks business opportunities and enhances human creativity. According to the father of Artificial Intelligence, John McCathy, Artificial Intelligence, is the science and engineering of making intelligent systems through intelligent computer programs. It refers to the ability of a computer or a computer-enabled robotic system to process information and produce output in a manner similar to the thought process of human asset in learning and decision making.

The beginning of AI is credited to the contributions of various academic fields, not confined to art, history, philosophy logic and mathematics. The following is a review of the notable breakthroughs in the evolution of AI.

Cite this article as: Onchoke, Samuel I., "The Boon of Artificial Intelligence Systems in the 21st Century". *International Journal of Advanced Scientific Research & Development (IJASRD), 05* (08/I), 2018, pp. 24 – 30. https://doi.org/10.26836/ijasrd/2018/v5/i8/50803.

*** Corresponding Author:** Dr. Samuel I. Onchoke, sonchoke@yahoo.com

According to Luger (1993), the empiricist and rationalist traditions of philosophy contributed to the evolution of AI. For the rationalist, the external world can be reconstructed through the rules of mathematics. The empiricists do not believe on the environment of clear and distinct ideas. Knowledge is explained through empirical psychology. Based on this backdrop, Luger opines that knowledge plays a significant role in the development of AI structures and programs.

Russell and Norvig (1995) assert their philosophical analysis of intelligent agents on the notion that intelligence is a manifestation of rational action; an intelligent agent takes the best action in a given situation. Philosophy conceptualized this idea, which later formed the basis of AI, by equating the behaviour of the mind to that of a machine that operates on knowledge encoded in some internal language, and the thought can be used to choose what actions to take.

Once thinking is determined as a form of computation, the next step is to formalize and mechanize it. Luger defines this as the phase involving the "development of formal logic"; wherein the patterns of algebraic relationships are treated as entities that could be studied for the creation of a formal language for thought. The author also credits George Boole for his contribution to Boole's operations of "AND", "OR" and "NOT" which are the basis for operations in formal logic. The work of Whitehead and Russell's has been acknowledged by Luger, as a result of treating mathematical reasoning in formal terms as the basis for computer automation.

Russell and Norvig (1995) opine that mathematics could be used to manipulate statements of logical certainty as well as probabilistic statements, in addition to laying the bedrock for computation and algorithms. The field of economics has enhanced the contribution of mathematics by formalizing the decision-making problem in order to maximize outcome.

Nils Nilsson (2010) suggested that aspects of biology and living things provide important clues about intelligence. This includes principles that concern neurons & the function of the human brain, psychology and cognitive science. Russell and Norvig (2015), points out in neuroscience, that the human brain can be similar to computers in some ways. This provided the intuitive basis for AI. This was supplemented by psychology through the idea of human beings and animals being systems that process information.

The field of engineering has made direct contribution towards the development of electronic devices on which AI applications are allowed to run. The following are facets that have made this possible:

- Automata, sensing and feedback;
- Statistics and probability; and
- The computer.

In the work of Norvig, P. (2011), The White House's National Science and Technology Council trace the roots of AI to the1940s, "A Logical Calculus of the Ideas Immanent in Nervous Activity." The idea of artificial intelligence was crystallized by Alan Turing, in his famous 1950s paper "Computing Machinery and Intelligence." The fundamental question posed in that paper was whether machines think; which Turing sought to answer using what came to be known as the Turing Test. He also believed that a machine could be programmed to learn from experience, much like a newly born child. However, the term 'Artificial Intelligence' was not coined until 1956. The Turing Test

became the standard for AI development. Luger identifies its defining features as: it provides an objective notion of intelligence; enables one dimensional focus by containing a single standard of measurement; that eliminates bias by centering focus of a neutral third-party on output. The emergence of AI as an independent research field was strengthened by the following meetings – a 1955 session on Learning Machines held in conjunction with the 1955 Western Joint Computer Conference in Los Angeles, a 1956 summer research project on Artificial Intelligence convened at Dartmouth College and a 1958 symposium on the "Mechanization of Thought Processes" sponsored by the National Physical Laboratory. Earlier development of AI was to solve mathematical problems, puzzles or games by relying on simple symbol structures. In 1960s, programs were required to perform intellectual tasks such as solving geometric analogy problems, storing information, answering questions and creating semantic networks, thereby requiring more complex symbol structures termed as semantic representations.

The creation of the General Problem Solver (GPS) was the next big break through. The GPS pioneered first approaches of 'thinking humanly'. It was designed to imitate human problem - solving protocols, solving puzzles using the same approach as human beings.

In 1958, the computer scientist John McCarthy defined Lisp, the programming language that later became dominant for AI; invented time sharing; and; in a 1958 paper, described the Advice Taker, which was seen as the first end-to-end AI system.

In 1950s and 60s Natural Language Processing (NLP), the bedrock for AI development, got a boost due to increased funding. Natural languages such as English were understood by machines and translated into a language that was understood by computers. This in turn resulted in the re-conversion into natural language as the output.

In late 1970s focus shifted to real-world problems, leading to the creation of sub-categories such as NLP, expert systems, and computer vision. While as NLP and AI were earlier greatly restricted to text-based systems, the 1970s and 80s saw its venture into speech recognition and comprehension. Advances in this field were made in pursuit of specific applications such as computer vision, aerial reconnaissance, cartography, robotics, medicine, document analysis, and surveillance. Funding for and enthusiasm in AI research was sustained by the promise of its applications, especially in expert systems described as the AI Boom, bolstered by Japan's "Fifth Generation Computer Systems" project and Europe's ESPRIT programme.

In 1980s great attention was paid to machine learning, which has become one of the prominent branches of AI. During this time, AI anchored itself as a separate industry, so much that most major corporations in the US had separate groups working on it.

In 1995 research on end-to-end intelligence agents began, and continues to this day. The availability of computers, large databases and the growth of the internet have prompted AI to expand rapidly and embraced in solving real-world problems. AI has become both autonomous and ubiquitous. It prevails in everything from controlling, coordinating home appliances effectively, and navigation, internet tools such as search engines, recommender systems and website aggregators.

Today's AI rely on the collection, usage and processing of lots of data i.e. huge quantities of data that previously required expensive hardware and software can be conveniently processed; new forms of data such as ICR, transcription, voice and image and

enhanced algorithms such as recurrent neural networks and deep learning have been adopted.

1.1 Objectives of the Study

(a) To trace the history and development of artificial intelligent systems to-date.
(b) To describe select applications of artificial intelligence in operations.
(c) To appraise the benefits of artificial intelligence systems in the modern enterprise.
(d) To suggest ways developing economies can first develop and embrace artificial intelligence technologies.

1.2 Research Design

Descriptive research design was applied for this study.

1.3 Sources of Data Collection

The article is based on secondary data sources such as magazines, books and relevant scholarly internet-based materials.

1.4 Limitations of the Study

The article illuminates select applications, benefits of artificial intelligent systems.

1.5 Practical Utilization of AI

(a) Deep learning: This is machine learning based on a set of algorithms that model high-level data abstractions. Unlike human assets, machines are connected and if one machine makes a mistake, all autonomous systems will keep this in memory and avoid the same mistake the next time.
(b) Robotics: According to the Standard EN 775 a robot is an "automatically controlled, re-programmable, multi-purpose processing device, which has several degrees of freedom, and which may be stationary or mounted to be movable, for use in industrial automation systems." Robots work more precisely than human asset and cost less. The development of creative solutions such as 3D printers and self learning ability of robots are likely to replace human resources.
(c) Dematerialization: In this case, autonomous software collects necessary information and sends it to the employee who needs it. The data processing 'back-office' operations will no longer be required. The traditional physical devices such as CDs or DVDs are being replaced by streaming services.
(d) Gig economy: this includes two forms of work: 'crowd working' and 'work on-demand via apps' organized networking platforms. Today there are many independent contractors for individual tasks that companies advertise on online platforms such as 'Amazon Mechanical Turk'.
(e) Autonomous vehicles: In this case vehicles are developed with the power for self-governance and direction using sensors and navigate without human input. Taxi drivers will be a thing of the past and the traditional way of distributing parcels and drawing of maps are likely to be done by drones.
(f) Google map application advice road users on the shortest route to destination based on incremental past and current traffic conditions on alternative routes.

Environmental decision support systems could be applied to manage environmental critical situations such as floods, air and water pollution levels in metropolitan cities.

1.6 Benefits of AI and Robots

The use of AI and robots, in business, leads to considerable savings in terms of cost of labour, goods and services. It is opined that while a production working hour costs the German automotive industry more than €40, the use of a robot costs between €5 and €8 per hour. A robot is thus cheaper than a worker in China. A further aspect is that a robot cannot become ill, take maternity or paternal leave or go on strike and is not entitled to annual leave. An expert computer system does not depend on external factors and so it works reliably and constantly, 24/7, and can work in danger zones. As a rule, its accuracy is greater than that of a human, and it cannot be distracted either by fatigue or by external circumstances. Work can be standardized and synchronized to a greater extent, resulting into efficiency and better control of performance and more transparency in business operations. In decision-making, autonomous systems can be guided by objective standards, and decisions can be made rationally. The advantage for employees is that they have to do less manual or hard work. Repetitive, monotonous work can be performed by autonomous systems.

Artificial intelligent systems support and save lives. For instance AI systems applied in medical diagnostics have high accuracy with remote control and integrated camera systems; An inspection robot, Robo Gas Inspector', equipped with remote gas sensing technology, can inspect and detect leaks in above-ground and underground gas pipelines without putting humans at risk.

While the trends of automation and digitalization continue to develop in developed countries, low-labour-cost emerging countries, such as China, India and South Africa, benefit from surplus of low-skilled workers. If multinational enterprises decide to produce in their countries of origin, using AI, robots and a few highly skilled workers, the surplus of low-skilled workers might turn into a curse for developing countries in terms of mass unemployment and a wave of migration. According to the 2016 study by the World Economic Forum, technically highly equipped countries such as Switzerland, the Netherlands, Singapore, Qatar or the US are considered to be well prepared for the fourth industrial revolution unlike majority of the economies especially in Asia and Africa.

DISCUSSION

As artificial intelligent systems and robots take over more of the known, well-defined work, there is need to foster a culture of science, technology, innovation and research to find new problems and opportunities so as to create new products and value that do not exist. There is need to enhance the degree of artificial intelligence and robot development and skills of young people who will shape the future of the global labour market for sustainable industry needs realizing that about 80 per cent of future jobs will require advanced skills in science, computer technology, engineering, and mathematics. We also need not lose sight of the values and ethics involved in the forth industrial revolution. Standards must be established and regulated, and engineers have to realize that what they design and develop is not without consequence. Leaders will have great responsibility to steer business operations greater heights through expert systems and robotics.

CONCLUSION

Based on the above descriptive backdrop, AI systems are electronic devices that think and act rationally using cognitive human approach. They are critical and fundamental for the realization of sustainable economic growth and development. They are expected to give solutions to social problems, such as labour shortage caused by low birthrate and aging society, high cost of production, inefficiency and ineffectiveness and managing natural uncertainty such as floods.

Although AI technologies bring great benefits to people, they are likely to affect the society by advancing without awareness because their development is so fast that it inevitably surpasses the pace of organizational and social adaptation. Thus the influence of AI technologies on organizations and the society should be deliberated to ensure that the technologies are used safely and beneficially. Ethical, legal, and social implications surrounding AI technologies should be disseminated among various stakeholders such as end users, researchers, engineers, governments, academic institutions concerning utilization and provide policy recommendations on how to increase productivity, decrease heavy workload, accelerate science, and diagnose and treat diseases as good opportunities. They should also address likely job loss especially to economies such as India and China that depend largely on the human asset in operations and likely risks to humans.

REFERENCES

[1] Arbess, D. (2016). "This is the future of artificial intelligence". Fortune http://fortune.com/2016/06/15/future-of-work-2/

[2] Benaich, N. (2015). "Investing in artificial intelligence. TechCrunch." Retrieved from https://techcrunch.com/2015/12/25/investing-in-artificial-intelligence/

[3] Brooks, R. A. (2003). "A robot that walks: emergent behaviours from a carefully evolved network in Cambrian Intelligence: the early history of the new AI". Bradford Books. Cambridge, pp. 27-36.

[4] Chen, N. et al. (2016). "Global Economic Impacts Associated with Artificial Intelligence. Boston: Analysis Group Study". Retrieved from http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/ag_full_report_economic_impact_of_ai.pdf.

[5] Feng-hsiung H. (2002). "Behind Deep Blue: Building the computer that defeated the world chess champion". Princeton University Press, Princeton

[6] Frey, C. B and Osborne, M. A. (2013). "The future of employment: How susceptible are jobs to computerisation?" Retrieved from http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf (last accessed on 28 February 2017)

[7] Gelernter H. and Rochester N. (1958). "Intelligent Behaviour in Problem Solving Machines". IBM Journal of Research and Development. vol. 2, p. 336

[8] House, W. (2016). "Preparing for the future of Artificial Intelligence". Executive Office of the President, National Science and Technology Council, Committee on Technology.

[9] International Organization of Employers. (2016). "Brief on Understanding the Future of Work".

[10] Luger, G. F. (1993). "Artificial Intelligence: Structures and Strategies for Complex Problem Solving."5/e. Pearson Education India.

[11] Newell, J. et al. (1959). "Report on general problem-solving program". Proceeding of the International Conference on Information Processing. Paris. pp. 256-264

[12] Nils J. Nilsson. Cambridge (2010).

[13] Norvig, P. (2011). "The Quest for Artificial Intelligence".

[14] Oettinger, A. G. (1952). "Simple learning by a digital computer". Proceeding of Association of Computing Machinery, pp. 55-60

[15] Russell, S., Norvig, P., & Intelligence, A. (1995). "A modern approach. Artificial Intelligence". Prentice-Hall, Egnlewood Cliffs, 25, 27.

[16] Shah, D. (2016). "Artificial intelligence: Breaking new grounds", ETCIO. Retrieved from http://cio.economictimes.indiatimes.com/tech-talk/artificial-intelligence-breaking-new-grounds/1923.

[17] UBS, (2016). "Extreme automation and connectivity: The global regional and investment implications of the Fourth Industrial Revolution." Retrieved from http://www.tadviser.ru/images/b/b7/Extreme_automation_and_connectivity_The_global%2C_regional%2C_and_investment_implications_of_the_Fourth_Industrial_Revolution.pdf.